Earth Simulator's Impact

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Lasting Impact of ES

- Re Computational Science: Japanese will likely lead the world for the next two years in some very large scale, non defense science applications. The US no longer has a monopoly on world class HPC.

- Re Climate simulations: The ES will permit much greater resolution of weather and climate models, which will probably result in greater influence on their approach for weather and climate prediction around the world.

Meaning for commodity, clusters of SMPs, Vectors

- Commodity clusters will continue to thrive because of their dropping costs & because many applications map well to clusters; however, industry and government now recognize clusters have limitations; i.e. memory and interconnect bandwidth, application programming complexity, reliability, and system software shortcomings.

- Vector systems clearly are not dead, as they provide one solution to memory bandwidth problems; however, future vector systems, beyond even the Cray X1 will require vastly improved scalar processing capability to be able to capture sufficient business to compete with commodity processor systems.

What steps should US take?

- Nothing is more effective than large scale focused government investment. The US ought to have a long term, multi-agency focused plan, emphasizing both national security & basic science applications, and invest in technologies and system development (including memory chips and sub systems, interconnect, both memory and inter processor, optical and broadcast) as well as appropriate SW technologies.
- Broad bi-partisan Congressional support is needed for multi year funding.
- The ROI to the US economy from government investment in computer and related electronics technology over the last forty years has been enormous and has changed society dramatically (can you think of a better ROI examples?).
- Let's work with our research funding organizations to help Congress understand this and convince them to support appropriate R&D through future significant investment.

Are we in a SC race?

- SCs have an element of national pride as well as economic impact.

- Vector systems from NEC and the high bandwidth scalar, commodity processor based cluster systems from Fujitsu are very significant products.

- Multinational projects can be successful (space station) or not (SSC), but always have a political dimension.

Are we in a SC race?

- However...

ES is having a highly positive impact on HPC both in Japan, US, and elsewhere.

Competition brings out the best in everyone.

Let's focus on the science.

Thank you very much for your attention.